

# **ENVIRONMENTAL ASSESSMENT**

## **Cooperative Gypsy Moth Project For Indiana 2002**

by

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Division of Entomology & Plant Pathology**

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## 1.0 PURPOSE AND NEED FOR ACTION

### 1.1 Proposed Action

The Indiana Department of Natural Resources (IDNR), Division of Entomology & Plant Pathology and Division of Forestry, proposes a cooperative project with the United States Department of Agriculture (USDA), Forest Service (USFS) to treat the gypsy moth populations at eleven sites in six counties (see maps in Appendix B). Gypsy moth populations proposed for treatment cover an estimated 16,848 acres (Table 1). The preferred alternative for this project is Alternative 5: Btk, mating disruption and mass trapping. A state-funded project to treat two areas with Btk by ground application is not part of the cooperative project, but it is included in this environmental analysis.

Table 1. Proposed Treatment Sites for 2002.

COUNTY	PROPOSED SITES	TREATMENT ACRES			
		Btk (aerial)	Btk * (ground)	Mating disruption	Mass trapping
Allen	Rest Park	75			
Elkhart	Wakarusa			531	
Kosciusko	Dewart			75	
Kosciusko	Pierceton		<1		78
Kosciusko	Robinson Lake			721	
LaPorte	Northbrook			6,206	
	Northbrook (Core)	110			
	Joy (Core)	231			
LaPorte	Lamb's Chapel			5,721	
	Lamb's Chapel (Core)	600			
LaPorte	Jongkind			2,199	
Whitley	Old Trail		<1	201	
St. Joseph / Elkhart	Ash / Pierce				52
St. Joseph	Shively Rd.				48
Totals by Treatment		1,016	<1	15,654	178
Total of All Treatments		16,848			

\* Btk ground treatments are state funded, and are not a federally funded action.

### 1.2 Project Objective

The objective for this cooperative project is to slow the spread of the gypsy moth populations by eliminating reproducing populations from the proposed treatment sites.

### 1.3 Need for Action

Gypsy moth is not native to the United States, and it lacks effective natural controls. The caterpillars feed on the foliage of many host plants. Oaks are the preferred host species, but the caterpillars defoliate many species of trees and shrubs when oaks are not available. As the caterpillars grow

older, their host preference may change to include evergreens. Also, high numbers of gypsy moth caterpillars can cause a substantial public nuisance, affect human health, reduce tree growth, and result in branch dieback or even tree mortality.

The State of Indiana, with the IDNR, Division of Entomology and Plant Pathology as the lead agency, is dedicated to preserving urban and rural forested habitats from damage by gypsy moth and to enforcing interstate and intrastate quarantines to further protect areas not currently infested by this pest.

If no action is taken, gypsy moth will increase and spread, causing defoliation to occur sooner. Therefore, the "no action" alternative is not preferred due to local officials and citizen desire to eliminate the isolated infestations, prevent human discomfort associated with infestations, delay damage to local plant communities and reduce spread to adjacent uninfested areas.

#### **1.4 Decisions to be Made and Responsible Officials**

The preferred alternative in this document proposes cooperative participation of the USFS and the IDNR in treating gypsy moth populations in Indiana. The decision to be made by the responsible USFS officials is to choose which of the alternatives presented in this document best fulfills the objectives of the proposed action, and thus the needs of the people of Indiana. In addition, the decision will have to be made as to whether or not any perceived significant environmental impacts could result from the implementation of this project. If there are none, this will be documented in a Decision Notice and FONSI (Finding of No Significant Impact). If significant environmental impacts are found and the project is to continue, an Environmental Impact Statement (EIS) would be prepared.

The alternatives analyzed for this environmental assessment are: 1) No cooperative project (No action), 2) Btk, 3) Mating disruption, 4) Mass trapping, 5) Btk, mating disruption and mass trapping (Preferred Alternative).

The responsible USFS official who will make this decision is:

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## 1.5 Scope of the Analysis

A final environmental impact statement (FEIS), developed by the USDA, Animal & Plant Health Inspection Service (APHIS) and USFS, entitled Gypsy Moth Management in the United States: a cooperative approach (USDA 1995) was made available in November 1995. The Record of Decision for the FEIS was signed in January of 1996 (USDA 1996), and Alternative 6 was selected, which includes all three management strategies analyzed – suppression, eradication, and slow-the-spread. These strategies depend upon the infestation status of the area: generally infested, uninfested, and transition. Implementation of the FEIS preferred alternative requires that a site-specific environmental analysis be conducted to address local issues before federal or cooperative projects are conducted. This site-specific analysis is tiered to the programmatic environmental impact statement (USDA 1995). As part of the analyses conducted for the FEIS, human health and ecological risk assessments were prepared (Human Health Risk Assessment, Appendix F to the FEIS and Ecological Risk Assessment, Appendix G to the FEIS). The purpose of tiering is to eliminate repetitive discussions of the issues addressed in the FEIS (40 CFR, 1502.20 and 1508.28 in Council on Environmental Quality, 1992).

This analysis considers the proposed treatment sites for the Cooperative Gypsy Moth Project for Indiana and the proposed treatment sites for a connected state-funded project. The state-funded project proposes to ground treat, with Btk, a few trees with eggmasses in the center of cooperative treatment sites that are being treated with mating disruption or mass trapping. Since these treatments overlap in area, the state-funded project is being analyzed in this Environmental Assessment.

## 1.6 Summary of Public Involvement and Notification

Public meetings were held during March 2002 (Table 2). Notices were mailed or hand delivered to elected officials, interested groups, residents and local media. At each meeting, state officials presented alternatives for gypsy moth management. The discussion included identification and biology of gypsy moth, pest impacts, survey methods, and control tactics. The proposed actions and alternatives, including no action, were discussed. Local issues, questions and concerns raised at the public meetings are in Appendix A.

Table 2. Date and Number Attending Public Meetings in Each County.

COUNTY	DATE OF PUBLIC MEETING	# OF ATTENDEES
LaPorte	March 11, 2002	47
Allen	March 13, 2002	5
Whitley	March 13, 2002	3
Elkhart	March 14, 2002	5
Kosciusko	March 14, 2002	4

Information gathered at the public meetings and from resource professionals was used to develop issues and concerns related to the project. They are grouped into two categories; 1) issues used to formulate alternatives, and 2) other issues and concerns.

## **1.7 Issues Used to Formulate the Alternatives**

Each of the major issues is introduced in this section. Discussion pertaining directly to each issue as it relates to the alternatives can be found in Chapter 4.

**Issue 1 - Human Health and Safety.** Three types of risk are addressed under this issue: 1) an aircraft accident during applications, 2) treatment materials and potential effects on people, and 3) the future effects of gypsy moth infestations on people.

**Issue 2 - Effects on Nontarget Organisms and Environmental Quality.** The major concerns under this issue are 1) the impact of treatment materials to nontarget organisms, including threatened and endangered species that may be in the treatment sites, and 2) the future impacts of gypsy moth defoliation on the forest resources, water quality, wildlife and other natural resources.

**Issue 3 - Economic and Political Impacts of Treatment vs. Non-Treatment.** Gypsy moth outbreaks can have significant economic impacts due to effects on the timber resource, nursery and Christmas tree producers, and recreational activities. An additional economic impact is a gypsy moth quarantine imposed to regulate movement of products from the forest, nursery and recreational industries to uninfested areas.

**Issue 4 - Likelihood of Success of the Project.** Reducing the spread rate of gypsy moth within Indiana is the objective of this project. Alternatives vary in their likelihood of success for the current situation in Indiana. Consideration of project success is important for delaying gypsy moth impacts to Indiana and neighboring states.

## **1.8 Other Concerns and Questions**

Concerns and questions were discussed during the public meetings (see Appendix A). Also, other agencies were consulted (see Appendix C). Information from these sources was used to develop mitigating measures, management requirements and constraints.

## **1.9 Summary of Authorizing Laws and Policies**

**State.** The division director (State Entomologist) may cooperate with a person in Indiana to locate, check, or eradicate a pest or pathogen (Indiana Code 14-24-2-1). The division director may, on the behalf of the department, enter into a cooperative agreement with the United States government, the government of another state, or an agency of the United States or another state to carry out this article (Indiana Code 14-24-2-2). Aerial applicators must meet Indiana Pesticide Use and Application Law (Indiana Code 15-3-3.6) to provide safe, efficient and acceptable applications of pesticides. The Non-Game and Endangered Species Conservation law (Indiana Code 14-22-34) applies to this project.

**Federal.** Authorization to conduct treatments for gypsy moth infestations is given in the Plant Protection Act of 2000 (7 U.S.C. section 7701 et.seq.).

The Cooperative Forestry Assistance Act of 1978 provides the authority for the USDA and state cooperation in management of forest insects and diseases. The law recognizes that the nation's capacity to produce renewable forest resources is significantly dependent on non-federal forestland. The 1990 Farm Bill (P.L. 101-624) reauthorizes the basic charter of the Cooperative Forestry Assistance Act.

The National Environmental Policy Act (NEPA) of 1969 (P.L. 91-190), 42 USC 4321 et.seq. requires a detailed environmental analysis of any proposed federal action that may affect the human environment. The courts regard federally funded state actions as federal actions.

The Federal Insecticide, Fungicide and Rodenticide Act of 1947, (7 USC 136) as amended, known as FIFRA, requires insecticides used within the United States be registered by the United States Environmental Protection Agency (EPA).

Section 7 of the Endangered Species Act prohibits federal actions from jeopardizing the continued existence of federally listed threatened or endangered species or adversely affecting critical habitat of such species.

Section 106 of the National Historical Preservation Act and 36 CFR Part 800: Protection of Historic Properties requires the State Historic Preservation Officer be consulted regarding the proposed activities.

USDA Departmental Gypsy Moth Policy (USDA 1990) assigns the USFS and APHIS responsibility to assist states in protecting non-federal lands from gypsy moth damage.

## 2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

### 2.1 Process Used to Formulate the Alternatives

Staff entomologists and administration within the IDNR, Division of Entomology and Plant Pathology and the Division of Forestry in cooperation with USDA Forest Service, formulated several alternatives to treat the gypsy moth populations in Indiana under the slow-the-spread strategy (See Chapter 6, Persons and Agencies Consulted).

The FEIS (USDA 1995), which this document is tiered to, allows the USDA to participate in the Cooperative Gypsy Moth Project for Indiana. The USDA can assist in conducting eradication, slow-the-spread and suppression strategies. The FEIS lists the treatment options for each of the strategies (USDA 1995, Vol. II, p.2-15). For the slow-the-spread strategy, the following six treatment options may be considered: 1) *Bacillus thuringiensis* var. *kurstaki* (Btk), 2) diflubenzuron (Dimilin), 3) nucleopolyhedrosis virus (Gypchek), 4) mass trapping, 5) mating disruption (pheromone flakes), and 6) sterile insect release. These treatment options from the FEIS were used as the alternatives for the site-specific analysis of this Environmental Assessment.

### 2.2 Alternatives Eliminated from Detailed Study

The following alternatives that are available were eliminated from consideration:

**Diflubenzuron (Dimilin).** The label for diflubenzuron (Dimilin) prohibits its use over wetlands and directly to water. Some treatment sites contain lakes, marsh, rivers and/or wetlands. Therefore, its use was not considered for this project. This does not preclude the consideration and use of Dimilin in future projects.

**Gypsy moth specific nucleopolyhedrosis virus (Gypchek).** Gypsy moth nucleopolyhedrosis virus (Gypchek) has a very limited supply and is targeted for use in special areas that have high environmental concerns. There are questions concerning Gypchek effectiveness in low-level gypsy moth populations. It is preferably used in suppression projects against moderate to high gypsy moth populations. Therefore, NPV is not considered for this project. In future projects, it will be evaluated for use.

**Sterile insect release.** The FEIS documents the use of sterile insects for elimination of isolated gypsy moth populations. It also documents the obstacles of using this alternative - the limited release period; need to synchronize production of sterile pupae and release into the population; and the limited availability. This treatment alternative is currently not available, and it has not used in recent eradication or slow-the-spread treatment projects. Giving consideration to these obstacles, this alternative was not considered for this project. In future projects, it will be evaluated for use.



## 2.3 Alternatives Considered in Detail

**Alternative 1 - No action.** If no action is taken, the gypsy moth will reproduce and populations will begin to defoliate trees in the area. Gypsy moth populations will develop and spread to surrounding areas. This is not a preferred alternative because damage and regulatory action will occur sooner than if other alternatives are selected.

**Alternative 2 - Btk.** This treatment option uses two applications of Btk at 30 billion international units (BIU) per acre applied from air or ground. The applications would begin when leaf expansion is near 50% and when first and second instar caterpillars are present and feeding. This usually occurs between late April and late May in Indiana. The second application would follow 7-10 days after the first application. Most commercial formulations of Btk are aqueous flowable suspension (e.g., trade names: Foray, Thuricide) with application rates of 8-48 BIU per acre (Appendix D – example of product labels). For aerial application at 30 BIU, less than 3.0 quarts of the product would be applied per acre.

Btk has been the most used treatment option in Cooperative Gypsy Moth Projects in Indiana and other states since 1989. Btk is a naturally occurring soil-borne bacterium that is mass-produced and formulated into a commercial insecticide. The Btk strain is effective against caterpillars, including the gypsy moth caterpillar. Caterpillars ingest Btk while eating the foliage. Once in the midgut, Btk becomes active and causes death within a few hours or days (USDA 1995, Vol. II, p. A3-A5). Btk may impact nontarget species of spring-feeding caterpillars in the treatment sites, but the impact to the local population is usually very minimal as Btk rapidly degrades on the foliage within a few weeks, and the nontarget lepidopterans generally re-colonize treatment sites in less than 2 years (USDA 1995, Vol. II, p. 4-52 to 4-55). Human exposure to Btk provides little cause for concern, though direct exposure to the spray may cause temporary eye and respiratory tract irritation in a few people (USDA 1995, Vol. II, p. 4-13). Btk applications can meet the project objectives of eliminating gypsy moth populations from the proposed treatment sites.

**Alternative 3 - Mating disruption.** This treatment option uses one aerial application of pheromone flakes prior to the emergence of male moths. This would occur in mid-June to early July. Mating disruption relies on the attractive characteristics of the gypsy moth sex pheromone, disparlure. The objective of mating disruption is to saturate the treatment area with enough pheromone sources to confuse the male moths and prevent them from finding and mating with female moths. Mating disruption is considered specific to gypsy moth and is not known to cause impacts to nontarget organism populations, water quality, microclimate, or soil productivity and fertility (USDA 1995, Vol. II, p. 4-67).

Mating disruption involves the aerial application of plastic flake dispensers that are impregnated with the gypsy moth pheromone. The formulation of Disrupt II (see Appendix D – example of product labels) consists of small plastic flakes, approximately 1/32 inch x 3/32 inch (1 x 3 mm) in size, thus the name “pheromone flakes”. A sticker, Monsanto's Gelva 2333, is applied to the flakes as they are dispersed from the aircraft, which aids in the distribution of the flakes throughout all levels in the forest canopy where mating could potentially occur. The flakes are green in color and applied at a rate of 6, 15 or 30 grams active ingredient (disparlure) per acre. At the high rate of 30

grams, 170 grams of flakes are applied in 4 fluid ounces of sticker per acre (4 flakes per sq.ft.) (Reardon et al. 1998). All of the ingredients in the Gelva 2333 sticker are considered non-hazardous to public health if used as an additive in the insecticide formulation (40 CFR 180.1001). The application of pheromone flakes can meet the project objectives of eliminating gypsy moth populations from the proposed treatment sites.

**Alternative 4 - Mass trapping.** This treatment option places gypsy moth delta traps at a close spacing within the treatment sites. “The objective of this treatment is to capture male gypsy moths before they have a chance to locate and mate with female moths” (USDA 1995, Vol II, p. A-7). Mass trapping has proven capable of eradicating gypsy moth at very low population levels in isolated introductions.

“For mass trapping, delta or milk carton traps are deployed in an intensive grid pattern in an infested area and an adjacent buffer area at the rate of at least 9 traps per acre” (USDA 1995, Vol. II, p. A-8). Thus, it is very labor intensive, especially over large areas. Typically, mass trapping is used on small infestations of less than 100 acres. For the proposed treatment sites, the number of traps would range from 432 in the smallest site to 55,854 in the largest site. The use of mass trapping can meet the project objectives of eliminating gypsy moth populations from the treatment sites.

**Alternative 5 - Btk, mating disruption and mass trapping (Preferred Alternative).** The use of this alternative provides flexibility to select Btk, mating disruption, or mass trapping alone or in combination for each site based on the following criteria: 1) gypsy moth population level, 2) habitat type (urban or rural), 3) nontarget organisms, 4) safety and 5) cost and project efficiency. The use of this alternative can meet the project objectives of eliminating gypsy moth populations from the proposed treatment sites.

## 2.4 Comparative Summary of Alternatives

Table 3. Summary of Environmental Consequences for Alternatives by Issues.

	<b>Issue 1</b> Human Health & Safety	<b>Issue 2</b> Effects on Nontarget Organisms & Environmental Quality	<b>Issue 3</b> Economic and Political Impacts	<b>Issue 4</b> Likelihood of Success of the Project
<b>Alternative 1</b> <b>No Action</b>	<ul style="list-style-type: none"> <li>- No risk of an aircraft accident or spill.</li> <li>- No risk of Btk contact with humans.</li> <li>- Gypsy moth outbreaks will occur sooner with the associated nuisance and health impacts to humans.</li> </ul>	<ul style="list-style-type: none"> <li>- No direct risk to nontarget organisms, including threatened and endangered species.</li> <li>- Future gypsy moth impacts will occur sooner, which includes defoliation and reduction in the oak component of forest stands.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would occur sooner.</li> <li>- Spread of gypsy moth through these counties and into adjacent counties would not be slowed.</li> </ul>	<ul style="list-style-type: none"> <li>- Gypsy moth would not be eliminated from treatment sites and project objective would not be met.</li> </ul>
<b>Alternative 2</b> <b>Btk</b>	<ul style="list-style-type: none"> <li>- Slight risk of aircraft accident and pesticide spill.</li> <li>- Contact with Btk may cause mild and temporary irritation (eye, skin &amp; respiratory) to a few people.</li> <li>- Delay effect of gypsy moth outbreaks on humans.</li> </ul>	<ul style="list-style-type: none"> <li>- Direct impact on spring feeding caterpillars, temporary reduction in local populations.</li> <li>- Indirect impact on nontarget organisms that feed on caterpillars is unlikely due to small percent of habitat treated.</li> <li>- No risk to Karner blue butterfly and Mitchell's satyr as neither species occur in or near treatment sites.</li> <li>- Delay the impact of gypsy moth defoliation on environmental quality.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would not be implemented in these counties during 2002.</li> <li>- Slows the spread of gypsy moth.</li> </ul>	<ul style="list-style-type: none"> <li>- Success is likely in the treatment sites.</li> </ul>
<b>Alternative 3</b> <b>Mating disruption</b>	<ul style="list-style-type: none"> <li>- Slight risk of aircraft accident.</li> <li>- No effect to human health.</li> <li>- Delay effect of gypsy moth outbreaks on humans.</li> </ul>	<ul style="list-style-type: none"> <li>- No risk to nontarget organisms, including threatened and endangered species.</li> <li>- Delay the impact of gypsy moth defoliation on environmental quality.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would not be implemented in these counties during 2002.</li> <li>- Slows the spread of gypsy moth.</li> </ul>	<ul style="list-style-type: none"> <li>- Success is likely in the treatment sites with very low populations.</li> </ul>
<b>Alternative 4</b> <b>Mass trapping</b>	<ul style="list-style-type: none"> <li>- No risk of aircraft accident or spill.</li> <li>- No risk of Btk contact with humans</li> <li>- No effect to human health</li> <li>- Delay effects of gypsy moth outbreaks on humans.</li> </ul>	<ul style="list-style-type: none"> <li>- No risk to nontarget organisms, including threatened and endangered species.</li> <li>- Delay the impact of gypsy moth defoliation on environmental quality.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would not be implemented in these counties during 2002.</li> <li>- Slows the spread of gypsy moth.</li> <li>- Cost is prohibitive in large treatment sites.</li> </ul>	<ul style="list-style-type: none"> <li>- Success is likely in the treatment sites with very low populations.</li> </ul>
<b>Alternative 5</b> <b>Btk, Mating disruption and mass trapping</b>	<ul style="list-style-type: none"> <li>- Same as alternative 2, 3 or 4 depending on the treatment at each site.</li> </ul>	<ul style="list-style-type: none"> <li>- Same as alternative 2, 3 or 4 depending on the treatment at each site.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would not be implemented in these counties during 2002.</li> <li>- Slows the spread of gypsy moth.</li> </ul>	<ul style="list-style-type: none"> <li>- Success is likely in the treatment sites.</li> </ul>

### 3.0 AFFECTED ENVIRONMENT

#### 3.1 Description of the Proposed Treatment Sites

**Allen County:** There are approximately 422,000 acres in Allen County and 30,500 acres of forest that contain both favorable and unfavorable host species.

**Rest Park:** The proposed treatment site contains 75 acres. The site is rural and includes the rest stops on both the North and South side of US 30. There are no residential areas in the block. The site contains woodlots north and south of US 30. There is a tower in the woodlot on the North side of the block. The area around the site is cropland and open fields and a small number of rural residences outside the treatment site. The forest is composed of oak, maple, ash, and other hardwood species. Gypsy moth was detected at this site in 2000 and delimited in 2001. The moth catch in these surveys indicates a low population. A survey detected eggmasses in the area of the rest stops. Btk is proposed for this site because the gypsy moth population is low, there are no concerns about threatened and endangered species and the site is a rural forest habitat.

**Elkhart County:** There are approximately 298,000 acres in Elkhart County and 29,400 acres of forest that contain both favorable and unfavorable host species.

**Wakarusa:** The proposed treatment site contains 531 acres. The site is urban to rural. Approximately 75 residences are within the site located along two county roads. Four ponds, natural or man-made, occur in the site. Tree canopy occurs over the residences and in three woodlots. The residences and woodlots are composed of oak, maple, ash, elm, shrubs and other hardwood species. The remainder of the site is cropland and open fields. Gypsy moth was detected at this site in 2000 and delimited in 2001. The gypsy moth catch in these surveys indicates a very low population. Surveys did not detect eggmasses. Mating disruption is proposed for this site because the gypsy moth population is very low.

**Ash/Pierce:** The proposed treatment site contains 52 acres. The site is rural farmland with approximately 20 residences located along the county roads. The tree canopy is the yard trees of the residences and trees lining the ditches in the area. The area around the residences is cropland and open fields without woodlots. Gypsy moth was detected at this site in 2000 and delimited in 2001. The gypsy moth catch in these surveys indicates a very low population. Surveys did not detect eggmasses. Mass trapping is proposed for the site because the gypsy moth population is very low and the only habitat for gypsy moth is scattered trees in yards and along roads. Mass trapping will target these trees.

**Kosciusko County:** There are approximately 344,000 acres in Kosciusko County, and 42,100 acres of forest.

**Pierceton:** The proposed treatment site contains 78 acres. The site is rural with a Cemetery at the center of the site. Hwy 13 runs north and south through the site. Rural residences are present in the site with conifer and hardwoods lining the residential properties. The site is composed of

fields with scattered trees and trees in fencerows. The trees in the site are mostly hardwoods – maple, oak, ash, elm, other hardwoods and shrubs. Two ponds formed by old gravel pits are present in the site. Gypsy moth was detected in 1999, delimited in 2000, and treated with mating disruption in 2001. Survey detected eggmasses with the core of the population on large hardwood trees in the cemetery. A state-funded project proposes to treat the core trees with Btk by ground application. The surrounding area that has suitable habitat is proposed for mass trapping by the cooperative project.

**Dewart Lake:** The proposed treatment site contains 75 acres. The site is an urban forest on the southwestern shores of Dewart Lake. The site is composed of residences and cottages. The urban forest is composed of maple, ash, oak and other hardwoods. Dewart Lake forms the north border. Gypsy moth was detected in 2000 and delimited in 2001. A small number of eggmasses were found in 2001. The surveys detected a very low population. Mating disruption using pheromone flakes is proposed for this site because the gypsy moth population is very low and the area is heavily wooded with continuous canopy.

**Robinson Lake:** The proposed treatment site contains 721 acres. The site is rural forest, and also contains a natural lake and farm fields. Rural residences and a Boy Scout Camp occur within the site. The forest is composed of maple, ash, elm, oak and other hardwoods. Gypsy moth was detected in 2000 and delimited in 2001. The surveys detected a very low population. Mating disruption using pheromone flakes is proposed for this site because the gypsy moth population is very low.

**LaPorte County:** There are approximately 384,000 acres in LaPorte County and 42,200 acres of forest that contain both favorable and unfavorable host species.

**Northbrook:** The proposed treatment site contains 6,206 acres with two core areas – the Joy core area that contains 231 acres and the Northbrook core area that contains 110 acres. The site is within the city limits of Michigan City. The north border of the site is Lake Michigan. The site is classified as “urban residential” and contains houses, businesses, factories, hospitals, schools, parks and other facilities common to a city. The urban forest is composed of oaks, maples, conifers, other hardwoods and shrubs.

Gypsy moth was detected in 2000 and delimited in 2001. The surveys identified a very low gypsy moth population in the site and low gypsy moth populations in the core areas. Mating disruption is proposed for the site because of the very low population. Btk is proposed for the core areas because the low population is above the threshold for mating disruption.

**Northbrook Core Area:** The proposed treatment site contains 110 acres. The site is a wooded residential community to the North of Michigan City. A portion of the area includes the Kimball Ditch. The northwest corner of the area is Lake Michigan. The urban forest is mostly oak with few open areas. Gypsy moth was detected in 2000, delimited in 2001, and eggmasses were found in the core area in 2001. These surveys indicated the gypsy moth population was low. Btk is proposed for this core area because the gypsy moth population is above the threshold for application of mating disruption.

**Joy Core Area:** The proposed treatment site contains 231 acres. The site includes manufacturing buildings, parking and loading dock areas. On the west side is a public park that includes a large playground and jogging path. In the northwest corner is a cemetery. In the southeast corner is a school. Residential areas are in the southwest and east side. Oak trees surround the manufacturing buildings and are throughout the residential area. Other hardwoods occur in the site. Gypsy moth was detected in 2000, delimited in 2001, and eggmasses were found in the core area in 2001. These surveys indicated the gypsy moth population was low. Btk is proposed for this core area because the gypsy moth population is above the threshold for application of mating disruption.

**Jongkind:** The proposed treatment site contains 2,199 acres. The site is rural forest and farms with residential subdivisions in the southwest and northeast corners. Rural and farm residences occur throughout the site. Over 200 residences are estimated to be within the site. The forest area is composed of oaks, maples, and other hardwoods and conifers. Orchards are present within the site, but they may be abandoned as residential development occurs in the orchards. Wetlands and man-made ponds occur throughout the site. High voltage power lines run east and west through the site. Radio towers are located outside the northeast corner of the site. The Pinhook Bog and surrounding National Park land near the southwest corner of the site is excluded (Appendix C – Consultation Memo). The northeast corner of the site was treated in 1999 and 2000 with Btk. Detection and delimit surveys in 2000 and 2001 found very low populations of gypsy moth still in the area. The site is proposed for mating disruption because of the very low populations of gypsy moth.

**Lamb's Chapel:** The proposed treatment site is 5,721 acres with one core area of 600 acres. The site is rural forest, farm fields and rural residences. The Springville Fen State Nature Preserve is one mile west of the core area on the south border of the site. The forest is composed of oak, maple, ash, elm, other hardwoods and conifers. There are several natural ponds and wetlands throughout the site.

Gypsy moth was detected in 2000 and delimited in 2001. The surveys identified a very low gypsy moth population in the site and low gypsy moth populations in the core area. Mating disruption is proposed for the site because of the very low population. Btk is proposed for the core area because the low population is above the threshold for mating disruption.

**Lamb's Chapel Core:** The proposed treatment site contains 600 acres. The core area is composed of forest, fields and rural residences. The forest is composed of oak, maple, ash, elm, other hardwoods and conifers. There are no ponds within the core area. Gypsy moth was detected in 2000, delimited in 2001 and eggmasses were found in the core area in 2001. These surveys indicated the gypsy moth population was low. Btk is proposed for the core area because the gypsy moth population is above the threshold for application of mating disruption.

**Whitley County:** There are approximately 214,800 acres in Whitley County, and 27,900 acres of forest.

**Old Trail:** The proposed treatment site contains 201 acres. The site is rural forest, farm fields and rural residences. There are 12 residences within the site with yard and windbreak trees and one woodlot. The forest is composed of oak, maple, ash, elm and other hardwoods. Conifers and hardwoods are around the residences. A wetland occurs on the east end of the woodlot. Gypsy moth was detected in 2000 and delimited in 2001. Surveys detected eggmasses in spruce on one residence. A state-funded project using Btk (ground application) is proposed for these spruce trees. The entire site is proposed for mating disruption because of a very low population of gypsy moth.

**St. Joseph County:** There are approximately 292,700 acres in St. Joseph County, and 27,400 acres of forest.

**Ash/Pierce:** This site occurs on the county line of St. Joseph and Elkhart Counties. The site is described under Elkhart County above.

**Shively Rd:** This proposed site contains 48 acres. The site contains rural farm fields with residences along the county road. The site has yard and fencerow trees and isolated field trees. Gypsy moth was detected in 2000 and delimited in 2001. Surveys detected eggmasses on one large oak tree in a crop field. The site is proposed for mass trapping because of the very low population of gypsy moth and the lack of forest habitat.

### 3.2 Threatened and Endangered Species

Consultation with the staff of the U.S. Fish and Wildlife Service determined that the federally endangered species Karner blue butterfly (*Lycaeides melissa samuelis*) does not occur in the counties proposed for treatment. They determined the Mitchell's satyr butterfly (*Neonympha mitchellii*) occurs in isolated locations of LaPorte County, but it is not known to occur near the sites proposed for treatment (Appendix C – U.S. Fish & Wildlife Letter).

The U.S. Fish and Wildlife Service indicated that there are no federally endangered/threatened species in the Springfield Fen State Nature Preserve in LaPorte County. However, a recent survey identified 8 species of state-threatened butterflies and moths and along with 17 species designated as rare. Since the Btk treatment site is almost a mile away, these species should not be adversely affected as long as the wind is not blowing towards the nature preserve during spraying (Appendix C – U.S. Fish & Wildlife Letter). Mitigation measures will be employed to avoid Btk drift toward the nature preserve. This site will be identified to the applicator of Btk as a site to avoid during aircraft turns and an emergency dump of Btk.

The treatment sites are within the range of the federally endangered Indiana bat (*Myotis sodalis*), bald eagle (*Haliaeetus leucocephalus*) and copperbelly watersnake (*Nerodia erythrogaster neglecta*). Adverse effects are not likely to the above species due to the limited range of the proposed project. "Given the very limited range of the current program and the specificity of pheromone treatment, the proposed project is not likely to adversely affect these listed species" (Appendix C – U.S. Fish & Wildlife Letter).

The IDNR, Environmental Unit reviewed the project. The Unit determined that “The Natural Heritage Program’s data indicate that there are five protected/managed properties located within the proposed treatment sites.” The Unit indicated that “the proposed activity will not adversely impact any state or federally endangered vertebrate, mollusc or crustacean” (Appendix C – IDNR, Memo). The IDNR, Division of Nature Preserves reviewed the project in reference to one of the protected sites – Springfield Fen and indicated “that the treatment actions done according to the plan will have no negative impacts on the rare species of butterflies and moths at Springfield Fen.” (Appendix C – Division of Nature Preserves Letter)

### **3.3 Protection of Historic Properties**

The State Historic Preservation Officer did not identify any historic buildings, structures, objects, districts or archaeological resources listed in or eligible for inclusion in the National Register of Historic Places within the probable area of potential effects that would be adversely affected by the program. (Appendix C –IDNR Letter Division of Historic Preservation and Archaeology).



## 4.0 ENVIRONMENTAL CONSEQUENCES

This section is the scientific and analytic basis for the comparison of alternatives. It describes the probable consequences (effects) of each alternative for each issue. Environmental consequences are summarized in Table 3 for each combination of the alternatives and issues.

### 4.1 Human Health and Safety (Issue 1).

**Alternative 1 – No action.** For this alternative, there would be no cooperative project, therefore risk of human contact with pheromone flakes or Btk and an aircraft accident during application would not exist. However, future impacts by gypsy moth to human health will occur sooner under Alternative 1 than if treatments are used to slow-the-spread of these gypsy moth populations. Gypsy moth outbreaks have been associated with adverse human health effects, including skin lesions, eye irritation, and respiratory reactions. Gypsy moth caterpillars can become a serious nuisance that can cause psychological stress in some individuals (USDA 1995, Vol. II, p. 4-9).

**Alternative 2 - Btk.** Human exposure to Btk provides little cause for concern about health effects. “On the basis of both the available epidemiology studies as well as the long history of use, no hazard has been identified for members of the general public exposed to Btk formulations” (USDA 1995, Vol. III, p. 4-15). Exposure to Btk may result in temporary eye, skin, and respiratory tract irritation in a few people. A detailed analysis of the risks posed to humans by Btk was conducted for the FEIS -- Human Health Risk Assessment (USDA 1995, Vol. III). Glare and O’Callaghan provide a comprehensive review of *Bacillus thuringiensis*, including Btk. They conclude with this statement, “After covering this vast amount of literature, our view is a qualified verdict of safe to use.” (Glare and O’Callaghan, 2000)

A slight risk of an accident always exists when conducting aerial applications – Btk uses two applications. To further reduce this risk, a detailed work and safety plan is required prior to program implementation, which outlines guidelines for aircraft inspections, Btk loading, and conditions for safe applications. The effect of gypsy moth outbreaks on humans would be delayed using this alternative.

**Alternative 3 – Mating disruption.** The toxicity of insect pheromones to mammals is relatively low and their activity is target-specific. Therefore the EPA requires less rigorous testing of these products than of conventional insecticides. Risk to human health due to exposure to disparlure, the active ingredient in pheromone flakes, is discussed in the FEIS (USDA 1995, Vol. II, pp. 4-30 to 4-32). Once absorbed through direct contact, disparlure is very persistent in humans, and individuals exposed to disparlure may attract adult male moths for prolonged periods of time. This persistence is viewed as a nuisance and not a health risk (USDA 1995, Vol. III, 8-1). In acute toxicity tests, disparlure was not toxic to mammals, birds, or fish (USDA 1995, Vol. IV, 5-5) therefore no effects to human health are anticipated.

A slight risk of an accident always exists when conducting aerial applications – mating disruption uses one application. To further reduce this risk, a detailed work and safety plan is required prior to program implementation, which outlines guidelines for aircraft inspections, pheromone flake

loading, and conditions for safe applications. The effect of gypsy moth outbreaks on humans would be delayed using this alternative.

**Alternative 4 – Mass trapping.** The human health effects are not anticipated from the use of disparture in the delta traps (see Alternative 3 above). The effect of gypsy moth outbreaks on humans would be delayed using this alternative.

**Alternative 5 – Btk, mating disruption, and mass trapping.** For this alternative, the treatment sites identified for Btk would have the human health and safety consequences stated above for Alternative 2. The treatment sites identified for mating disruption would have the human health and safety consequences stated above for Alternative 3. The treatment sites identified for mass trapping would have the human health and safety consequences stated above for Alternative 4.

#### **4.2 Effects on Nontarget Organisms and Environmental Quality (Issue 2).**

**Alternative 1 – No action.** With no treatments in 2002, future impacts by the gypsy moth would occur sooner. Defoliation by the gypsy moth will cause selective mortality of preferred host trees. During outbreaks, forest ecosystems can change due to a reduction of the oak component and an increase of tree species that are less desired by gypsy moth, such as maple and ash. Oak forests would likely consist of a more mixed composition in the future, though oak would still be a component.

Gypsy moth defoliation and subsequent tree mortality can affect nontarget organisms by dramatically changing habitats on a local scale. Heavy defoliation can remove food for other leaf-feeding species, including other caterpillars. However, it can also create new habitat for some species by creating snags and increasing understory plant development by increasing light penetration into defoliated areas. Impacts on a larger scale (national, regional, or state) are subtle, gradual, and may be noticeable only after many years or decades (USDA 1995, Vol. II, p. 4-74). Short- and long-term changes in nontarget species have been shown for moderate and heavy defoliation (USDA 1995, Vol. II, p. 4-47 and 4-50). An Ecological Risk Assessment (USDA 1995, Vol. IV) examined gypsy moth impacts on a wide variety of species (mammals, birds, reptiles, amphibians, fish, insects, mollusks, crustaceans, and other invertebrates). Further discussion of gypsy moth and its impact on forest conditions can be found in the FEIS (USDA 1995, Vol. II, p. 4-41 and 4-74).

**Alternative 2 - Btk.** Btk can have direct and indirect impacts on nontarget organisms. Direct toxicity of Btk is generally limited to the larval stage of moth and butterfly species. Btk is not toxic to vertebrates, honey bees, parasitic and predatory insects, and most aquatic invertebrates (USDA 1995, Vol. IV, p. 5-1). Btk has a direct adverse impact on caterpillars of moths and butterflies, but susceptibility varies widely among species. Btk, as used in gypsy moth projects, poses a risk to some spring-feeding caterpillars; however, permanent changes in their populations do not appear likely. An exception may occur in certain habitats that support small isolated populations of a particular species of moth or butterfly that is highly susceptible to Btk (USDA 1995, Vol. II, p. 4-54). The U.S. Fish and Wildlife Service identified two federally endangered butterflies - Karner blue butterfly (*Lycaeides melissa samuelis*) and the Mitchell's satyr butterfly (*Neonympha mitchellii*).

However, these species are not known to occur near the treatment sites (Appendix C - U.S. Fish & Wildlife Letter). Thus, no potential exists for Btk to impact these populations directly.

Btk may have an indirect effect on other organisms by a reduction in their food resource (e.g. caterpillars, pupae, or adult moths and butterflies). Any effects on vertebrates due to reduction in food availability are probably subtle, especially for mammals and birds that are very mobile. Populations of some gypsy moth parasites and some general lepidopteran parasites may be reduced, due to the reduction in number of potential hosts caused by the Btk spray (USDA 1995, Vol. IV, p. 5-7). The U.S. Fish & Wildlife letter identified the treatment sites within the range of the endangered Indiana bat, *Myotis sodalis*. Moths are the main food source for the Indiana bat. However, given the limited range of the current project, it is not likely that this project will adversely affect the Indiana bat. The U.S. Fish & Wildlife letter identified that the range of the bald eagle, *Haliaeetus leucocephalus*, and copperbelly watersnake, *Nerodia erythrogaster neglecta*, encompassed the treatment sites. "The proposed project is not likely to adversely affect these listed species" (Appendix C – U.S. Fish & Wildlife Letter).

Applications of Btk formulations do not increase levels of Btk in soil, and Btk persists for a relatively short time in the environment. Changes in soil productivity and fertility are not likely in the treatment sites, because Btk occurs naturally in soils worldwide. Additional information concerning the effects to soil can be found in Appendix G of the FEIS (USDA 1995, Vol. IV).

Application of Btk is likely to maintain the forest condition in the short-term by eliminating gypsy moth populations in the treatment sites, thus delaying gypsy moth from expanding and causing defoliation. In the long-term, gypsy moth will become well established in these counties; even if this alternative is implemented.

**Alternative 3 – Mating disruption.** The pheromone in the flake dispenser is specific to gypsy moth, and it will not affect other insects, including any threatened and endangered species of butterflies or moths.

A quantitative assessment of risk from mating disruption was not conducted for the FEIS because of disparlure's low toxicity to vertebrates and specificity to gypsy moth. As used in mating disruption, disparlure is not likely to impact nontarget organisms (USDA 1995, Vol. II, p. 4-67). The toxicity of insect pheromones to mammals is relatively low. In acute toxicity tests, disparlure was not toxic to mammals, birds, or fish (USDA 1995, Vol. IV, 5-5). At normal application rates, concentration of the pheromone (disparlure) impregnated in the flakes remains active for one season only. Therefore, no effects on nontarget organisms are anticipated from the proposed Disrupt II application.

Most ingredients in the flakes are insoluble in water, so the risk of disparlure leaching into groundwater is minimal. To determine the amount of disparlure that could potentially leach into water, 50 grams of flakes were submerged in 150 ml of water and vigorously agitated for 24 hours. Results indicate that less than 0.04% of the active ingredient (disparlure) contained in the flakes leached into water under these conditions. Disrupt II is applied at doses of 6, 15 or 30 grams of active ingredient (disparlure) per acre and 90% of the flakes are intercepted by and adhere to the forest canopy, where they remain until they have released most of the disparlure.

Using pheromone flakes to disrupt mating is likely to maintain the forest condition in the short-term by eliminating gypsy moth populations in the treatment sites, thus delaying gypsy moth from expanding and causing defoliation. In the long-term, gypsy moth will become well established in these counties; even if this alternative is implemented.

**Alternative 4 - Mass trapping.** The pheromone in the delta trap is specific to gypsy moth and will not have an effect on other insects or threatened and endangered species of butterflies or moths. “Mass trapping does not affect nontarget organisms, except those (primarily flying insects) that accidentally find their way into the trap” (USDA 1995, Vol. II, p. A-9).

Mass trapping is likely to maintain the forest condition in the short-term by eliminating gypsy moth populations in the treatment sites, thus delaying gypsy moth from expanding and causing defoliation. In the long-term, gypsy moth will become well established in these counties; even if this alternative is implemented.

**Alternative 5 - Btk, mating disruption, and mass trapping.** For this alternative, the treatment sites identified for Btk would have the nontarget and environmental consequences stated above for Alternative 2. The treatment sites identified for mating disruption would have the nontarget and environmental consequences stated above for Alternative 3. The treatment sites identified for mass trapping would have the nontarget and environmental consequences stated above for Alternative 4.

#### **4.3 Economic and Political Impacts of Treatment vs. Non-Treatment (Issue 3).**

**Alternative 1 – No action.** If no treatments were applied, the likely action would be to implement a quarantine in these counties during 2002. A quarantine would regulate movement of firewood, logs, other timber products, mobile homes, recreational vehicles, trees, shrubs, Christmas trees, and outdoor household articles. This would create a financial impact to industries that deal with these products.

If current populations are not treated, they will continue to reproduce and grow in size. Defoliation would become noticeable in the future, but it would be difficult to predict exactly when noticeable defoliation would occur. Requests for federal assistance to suppress gypsy moth would be likely when defoliation occurs. Suppression projects are generally more expensive in total dollars than eradication projects because much larger areas are treated. The economic impact to state budgets would increase, as responsible agencies would need to administer and fund these suppression projects.

Following defoliation, negative financial impacts are likely to occur for recreational industries such as resorts and campgrounds. Homeowners, private woodland owners, and forest-based industries could be impacted by gypsy moth treatment costs, tree mortality, and adverse human health effects.

**Alternative 4 – Mass trapping.** If treatments are applied, regulatory action is not likely for these counties in 2002, and the impacts listed under Alternative 1 would be avoided for 2002. Mass

trapping is typically used in small areas (less than 100 acres) because it is labor intensive (USDA 1995, Vol. II, p. A8-9). Its use for all treatment sites would be cost prohibitive.

**Alternatives 2 (Btk), 3 (Mating disruption) and 5 (Btk, mating disruption, and mass trapping).** If treatments are applied, regulatory action is not likely for these counties in 2002 and the impacts listed under Alternative 1 would be avoided for 2002.

Economic analysis from the Slow-The-Spread Program (STS) demonstrated the use of Btk, mating disruption and other STS technology reduced the spread of gypsy moth by as much as 60 percent (USDA 1997). The Eastern Plant Board recognized that the benefit of delaying gypsy moth resulted in an economic benefit of \$22.00 for each dollar invested in treatment cost and that the STS Program protected timber, recreation, and private property values (Eastern Plant Board 1997).

#### **4.4 Likelihood of Success of the Project (Issue 4).**

**Alternative 1 – No action.** Project objectives would not be met with this alternative. Gypsy moth would not be eliminated from the treatment sites, and its population would serve as a source for increased spread within the counties and into surrounding counties. If these populations were allowed to increase and expand, gypsy moth could spread through the state in 10-15 years (USDA 1997)

**Alternative 2 - Btk.** Project success is likely with this alternative. Btk is effective in eliminating gypsy moth in the treatment sites.

**Alternative 3 – Mating disruption.** Project success is likely with this alternative in most sites. However, a few sites have gypsy moth populations in core areas above the recommended level for treatment with mating disruption.

**Alternative 4 – Mass trapping.** Project success is likely with this alternative in most sites. However, a few sites have gypsy moth populations in core areas above the recommended level for treatment with mass trapping. Mass trapping is a labor-intensive treatment and sites greater than 100 acres are usually not mass trapped. It would not be feasible to mass trap all treatment sites.

**Alternative 5 - Btk, mating disruption, and mass trapping.** Project success is optimized with this alternative when treatment selection criteria are used to determine the use of Btk, mating disruption or mass trapping alone or in combination for each site. Treatment selection criteria used to evaluate each site are: 1) gypsy moth population level, 2) habitat type (urban or rural), 3) nontarget organisms, 4) safety, and 5) cost and project efficiency.

#### **4.5 Unavoidable Adverse Effects**

No unavoidable adverse effects were identified for the proposed project.

#### **4.6 Irreversible and Irretrievable Commitments of Resources**

An irreversible commitment of resources results in the permanent loss of: 1) nonrenewable resources, such as minerals or cultural resources; 2) resources that are renewable only over long periods of time, such as soil productivity; or 3) a species (extinction) (USDA 1995, Vol. II, p. 4-93). Except for Alternative 1, there is an irreversible commitment of labor, fossil fuel, and money spent on the project.

An irretrievable commitment is one in which a resource product or use is lost for a period of time while managing for another (USDA 1995, Vol. II, p. 4-93). For this project, no irretrievable commitments were identified.

#### **4.7 Cumulative Effects**

No cumulative effects were identified for this proposed project. Cumulative effects are the incremental impacts of the action when added to past, present, and reasonably foreseeable future actions, that collectively are significant.

Three sites proposed for treatment in 2002 had treatments in previous years, but the cumulative effects of these treatments are not significant. The Pierceton site was treated in 2001 with mating disruption. The northeast corner of Jongkind was treated in 1999 and 2000 with Btk. A small area on the south border of the Lamb's Chapel mating disruption site was treated in 1998 with Btk. The other sites have not had previous gypsy moth treatments.

Three sites are proposed to receive Btk treatments in core areas and mating disruption over the entire treatment sites (Northbrook, Lamb's Chapel, and Old Trail), and one site is proposed for Btk treatment in the core area and mass trapping over the entire treatment site (Pierceton). No cumulative effects are known or expected from these multiple treatments. Also, no gypsy moth treatments by the private sector are expected in the state during 2002.

#### **4.8 Other Information**

##### **Mitigation**

The Cooperative Gypsy Moth Project would implement the following safeguards and mitigating measures:

- The public will be notified of treatments and dates using news releases via local radio, TV and newspaper.
- Notice of treatment will be posted throughout each treatment site.
- Local safety authority will be notified by direct contact or phone calls.
- Employees of state and federal agencies monitoring the treatment will receive training on treatment methods to be able to answer questions from the public.

- Notification will contain information pertinent to the specific treatment, treatment boundaries, treatment schedule, and precautions to be taken.
- Application of Btk will be suspended when school children are present outside.
- Aircraft will be calibrated for accurate application of treatment material.
- Applications will be timed so the most susceptible gypsy moth stage is targeted.
- Weather will be monitored during treatment to assure accurate deposition of the treatment material.

## **Monitoring**

During the treatments, ground observers and/or aerial observers will monitor the application for accuracy within the block perimeters, swath width, and drift. Application information (e.g. swath widths, spray-on and spray-off, acres treated, and altitude) will be downloaded to an operations-base computer.

The Btk and mating disruption treatment sites will be monitored using delta traps to determine the effectiveness of the treatments. The Btk sites will use a 500-meter grid during 2002. The mating disruption sites will use a 1,000-meter grid during 2002 and 2003.

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